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1 BEAVER REINTRODUCTION

1.1 Introduction

Beaver are important regulators of aquatic and terrestrial ecosystems, with effects far beyond their food and space requirements (Naiman and others 1988). Beaver modify stream morphology and hydrology by cutting wood and building dams. This is turn influences a variety of biological responses within and adjacent to stream channels.

The predominance of beaver in the northwest drew early trappers and explorers to this part of the country. By 1900, continued exploitation left beaver almost extinct. Their removal from extensive trapping resulted in incised channels, loss of riparian and wetland areas, and loss of channel complexity critical to fish and invertebrate production. Historically, beaver have been key agents of riparian succession and ecology throughout North America. Beaver can be used to naturally transform pioneer woody vegetation into physical features that result in the expansion of floodplains, riparian community structure, diversity, and productivity. [2] Beaver have long been recognized for their potential to influence riparian systems. In rangelands, where loss of riparian functional value has been most dramatic, the potential role of beaver in restoring degraded streams is most appreciated but least understood. [1]

Beaver have been successfully transplanted into many watersheds throughout the United States during the past 50 years. This practice was very common during the 1950s after biologists realized the loss of ecological function resulting from over-trapping of beaver by fur traders before the turn of the century. Reintroduction of beaver has restored the U.S. beaver population to 6-12 million, compared to a pre-European level of 60-400 million. Much unoccupied habitat or potential habitat still remains, especially in the shrub-steppe ecosystem. In forested areas, where good beaver habitat already exists, reintroduction techniques are well established. [1]

1.1.1 Description of Technique

Beavers are live trapped from areas that have an excess population or from areas where they are deemed a nuisance. Transplanting beaver may create the conditions needed to both establish and maintain riparian shrubs or trees. In the case of newly restored habitat or areas far from existing populations, reintroduction without habitat improvement might be warranted. [1] The success rate is usually high, but this depends on the site they are moved to and the time of year they are moved. [2]

1.1.2 Physical and Biological Effects

Where beaver have been re-introduced the following benefits have been documented:
Elevated water table, which in turn improves vegetation condition, reduced water velocities, reduced

erosion, improved fish habitat (increased water depth, better food production, lower dissolved oxygen, and various water temperatures), reduced sedimentation, increased water storage, improved water quality, and more waterfowl nesting and brooding areas. Their effect at the landscape level is also important relative to population dynamics, food supply, and predation (Naiman, et. al. 1988).

Beaver dams on headwater streams can positively influence riparian function in many ways, they improve water quality by trapping sediments behind dams and by reducing stream velocity, thereby reducing bank erosion. Beaver ponds can alter water chemistry by changing adsorption rates for nitrogen and phosphorus and by trapping coliform bacteria. Beaver can also influence the flow regime within a watershed. Beaver ponds create a sponge-like effect by increasing the area where soil and water meet. Headwaters retain more water from spring runoff and major storm events, which is released more slowly, resulting in a higher water table and extended summer flows. This increase in water availability, both surface and subsurface, usually increases the width of the riparian zone and, consequently, favors wildlife communities that depend on that vegetation. Richness, diversity, and abundance of birds, herpetiles, and mammals can be increased by the activities of beaver. Beaver ponds are important waterfowl production areas and can also be used during migration. In some high-elevation areas of the Rocky Mountains, beaver are solely responsible for the majority of local duck production. In addition, species of high interest, such as trumpeter swans, sandhill cranes, moose, mink, and river otters, use beaver ponds for nesting or feeding areas. [1]

By starting lower in the first-, second-, and sometimes third-order drainages, or below areas of erosion, beaver activity and stream sediment transport can re-elevate the bed level of incised channels; reactivate floodplains; increase stream bank water storage and aquifer recharge; and increase sediment deposition and storage, creating favorable micro-site conditions for maximizing natural vegetative stabilization of the drainage.[2]

Once viable beaver complexes become established and are self-sustaining (3 to 4 years), the complexes themselves will begin to form natural gully plugs of a quarter- to half-mile in length, accelerating sediment deposition and riparian recovery further upstream. By facilitating the establishment of beaver dam complexes at intervals along a drainage to throughout a watershed, this process can create a leap frog effect, helping to accumulate or stabilize sediment in place throughout the system. [2]

1.1.3 Application of Technique

Ecosystem management, capitalizing on the beneficial effects of beaver activity, can be used to achieve riparian maintenance or improvement objectives through adjustments in land-use activities. For example, accelerated erosion could be mitigated by accelerating cycling rates of beaver complexes and

meadow formation in order to collect and stabilize the increased runoff and sediment in the drainage. Special management may be required to maximize woody and herbaceous vegetation re-growth rates in order to supply abundant building material and provide the basis for accelerated dam-building activity and cycling frequency. Other examples could include treatments such as maximizing beaver populations (and possibly supplemental dam reinforcements) though an initial construction phase, followed by population reductions and management for maintenance levels or desired effect. [2]

In other cases, beaver could be used to initiate or accelerate the natural restoration of degraded or lost riparian systems. Identifying limiting factors and providing supplemental management techniques to compensate for these factors are important. With physical site conditions improved for initiation of natural riparian establishment, the system could develop to a self-sustaining level with in as little as 3 to 4 years. By planting beaver in degraded sites, providing supplemental dam reinforcing material during initial construction (to reduce dam washout prospects), and maximizing vegetative re-growth and establishment, the physical laws and processes of nature can be used to accelerate riparian recovery and succession. [2]

1.2 Scale

Discuss local scale and effects on a landscape / stream network scale.

1.3 Risk and Uncertainty

The most difficult aspect of this technique is live trapping of beaver. This process can be time consuming and requires dedication. However once they are captured, they are easy to handle and receptive to being moved to a new site. [3]

Moving beavers at the wrong time of year can result in them leaving the area and becoming a nuisance downstream. If homeowners are nearby, over time the beavers may be liked or disliked based on what they are doing on private lands.[2] Common problems include cutting or eating desirable vegetation, flooding roads or irrigation ditches by plugging culverts, and increasing erosion by burrowing into the banks of streams or reservoirs. In addition, beaver carry Giardia species pathogens, which can infect drinking water supplies and cause human health problems. In these areas, it is important to work in cooperation with adjacent landowners.[1]

Beavers can be disruptive to the habitat of other wildlife species. Negative impacts may include loss of spawning habitat, increase in water temperatures beyond optimal levels for some fish species, and loss of riparian habitat. Caution should be used in introducing beaver into areas where they were not endemic. [1]

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1.4 Data Collection and Assessment

The first question asked should be "If the habitat is suitable, why are beaver absent?" Basic considerations in managing beaver include watershed erosion rates and volumes, dam and pond cycling frequencies (e.g., willow-based beaver complexes cycle faster than aspen, which are faster than cottonwood, etc.), construction material demand rates, availability (or potential) of suitable adjacent woody vegetation and types of adjacent woody vegetation. Other factors include carrying capacity, population dynamics and their management, and site-specific factors, such as bank stability, vegetative cover (the site should have an adequate food source), soil type, stream slope (gradient should be less than 3%), order, and size. [1]

1.5 Methods and Design

General

- Transplant beaver during their principal dam building period, August-October. This will allow for time to gather a food cache, but limit their time to explore before having to set up shop for the coming of winter.
- Transplant 3-5 beavers to a site, preferably from the same colony.
- Expect beaver to cut and use a large number of trees for dam construction during the first year or two after transplant.
- It may be helpful to provide beaver with a pickup truck load of aspen or other trees to use as building material at or near the reintroduction site. This may encourage beaver to stay near the site and strengthen dams built of sagebrush or other shrubs (Apple et al. 1985).
- Do not allow harvest of beaver in newly established colonies for at least 3 years.
- Grazing may need to be withdrawn for several seasons, depending on riparian condition. When resumed, use a grazing system beneficial to riparian systems.
- To be successful, there must be cooperation between adjacent landowners and local wildlife officials. A cooperative evaluation of existing habitat quality and potential adverse beaver activity is very important. [1,2]
- Evaluate sites for potential beaver release; gradient should be less than 3%, and the site should have adequate food supply.

Trapping

Site selection: Select small channels, and make sure the beaver frequent the shore for feeding. The water should be at least 10 to 12 inches deep. Tomahawk's Bailey Beaver trap is shaped and operates like a large suitcase. It must be set in an open position, entirely under water with the trip pan 8 inches below the waters surface. Some shoveling may be required to properly position the trap for optimal trapping conditions. The trigger should also be adjusted to about 4 inches under the water. This will ensure that muskrats swimming over it will not spring the trap. Remember, it is very important that you do not disturb the surroundings more than absolutely necessary when setting the

beaver trap. Freshly cut willow branches, or poplar (aspen or cottonwood) under 1¼ inches in diameter can be used as bait, and placed on the shoreline where the beaver visit. If there is a chance that the beaver will not pass over the center of the trap while moving towards the bait, long sticks or small logs should be placed in the mud, out from the shore to the trap at an angle to form an open V on the lake side. The opening generated by the logs should be about 14 to 16 inches wide over the center of the trap. The open V forces the beaver to swim over the trip pan of the trap and through the opening to reach the weeping willow bait on the shore at the rear of the trap. As the beaver swims over the trap, its body hits the trip pan and springs the trap. Before leaving the set trap, splash water over everything that was handled, including the area that was walked over. Wait until the water clears and look the trap over very carefully. Make sure that none of the mesh strands are over the end of the trigger arms at the hinges, and the safety hooks are released. Once sprung, the trap is positioned about one-half of the way out of the water, capturing the beaver unharmed and able to breathe. It is always a good idea to check your trap on a daily basis because prolonged exposure may cause death to the trapped beaver. To remove the beaver from the trap, simply unhook the inside arm of the large springs and allow them to rest against the opposite side, thus freeing the tension from the jaws. Tip the trap down toward the corner in which the beaver is facing. Open the safety catches and reach in, taking a hold of the beavers tail, and allowing the trap to fall open. Lift the beaver out and place it in a carrier. The trap can be reset immediately if desired, and ready to trap another beaver.

1.6 Project Implementation

1.6.1 Permitting

Permits may be necessary in order to trap or move beaver. Check with your local agencies.

1.6.2 Construction

1.6.3 Cost Estimation

Live traps are approximately $350 each.

1.6.4 Monitoring and Tracking

Based on objectives of transplant, water quality, temperature, fish presence / absence, vegetation, etc.

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1.6.5 Contracting Considerations

N/A

1.7 Operations and Maintenance

In cases where beaver live in close proximity to humans or features important to humans, they may need to be removed or their damage controlled. Control of nuisance beaver usually involves removing the problem animals directly or modifying their habitat. Beaver can be livetrapped (Bailey or Han-cock traps) and relocated to a more acceptable location or killed by dead-traps (e.g., Conibear #330) or shooting (Miller 1983). In cases where the water level in a dam must be controlled to prevent flooding, a pipe can be placed through the dam with the upstream side perforated to allow water flow.

Grazing may need to be withdrawn for several seasons, depending upon riparian condition. When resumed, use a grazing system beneficial to riparian areas.

1.8 Examples

1.9 References

[1]Federal Interagency Stream Restoration Working Group. 1998. Stream Corridor Restoration: Principles, Practices, and Practices.

[2]Smith, B. and D. Prichard. 1992. Riparian Area Management: Management Techniques in Riparian Areas. USDI-BLM Tech. Ref. 1737-6. 48p.

[3]Wood River RC&D. 1993. Using Beaver to Improve Riparian Areas. Wood River RC&D, Gooding, Idaho. 5p.

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1.10 Photo and Drawing File Names

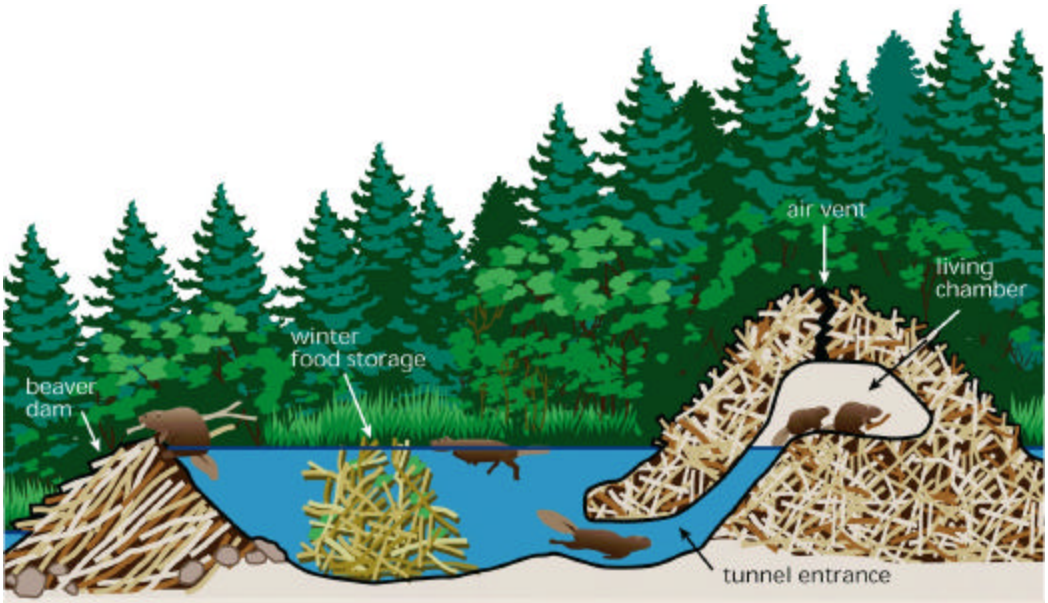

Fig. 8.21 – A beaver lodge.
In Stream Corridor Restoration: Principles, Processes, and Practices, 10/98.
Interagency Stream Restoration Working Group (FISRWG)(15 Federal agencies of the US).